Introduction to Lead Batteries

Public Workshop on Lead Batteries and Alternatives

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About Battery Council International

- 200+ members represent nearly 100% of U.S. lead battery sales and recycling
- Significant U.S. manufacturing base
  - More than 20,550 manufacturing jobs
    - Average wages $83,606 (mining and recycling)
    - Average wage $62,343 (battery manufacturing)
  - $11.2 billion in GDP; $28.5 billion in output
  - 129+ million car batteries sold annually (most made in NA)

Vital Power: Advanced Lead Batteries

- Power nearly 255 million cars and trucks (U.S.)
- Optimize wind, solar and green energy storage
- Backup energy for telecommunications, data centers, hospitals, etc.
- Motive power for golf carts, forklifts, railroad engines and more

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BCI Concerns About DTSC's Process

- Fewer than 30 days to address important issues and correct misstatements in the background paper
- Background paper and agenda suggest a predetermined outcome for the process

Correcting the Record

- No real potential exposure concerns
- No potential significant/widespread impacts
- Other errors in DTSC background paper
- See our white paper for discussion of criteria and references

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Virtually No Potential Exposure for Car and Truck Owner/Operators

- SLI batteries typically sealed, confined to engine bay
  - No day-to-day contact with drivers
  - No lead exposure even when batteries are replaced

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Virtually No Potential Exposure from Other Sources

- Lead battery facilities comply with existing stringent water, air, solid waste controls
  - All California facilities are in L.A. Basin - SCAQMD air constraints tightest in U.S.
  - EPA estimates new emission control technology in recycling facilities resulted in a 68% reduction in lead emissions between 2012-2014*
- Lead battery industry ranks very low as a lead emission source
  - 85%+ of all lead is used in batteries
  - BUT only 1.7% of total U.S. lead emissions from manufacturers and recyclers combined
  - Primary source of emissions = piston aircraft (48%), electricity generators, steel mills

*Source: Federal Register / Vol. 80, No. 2 / Monday, January 5, 2015 / Proposed Rules

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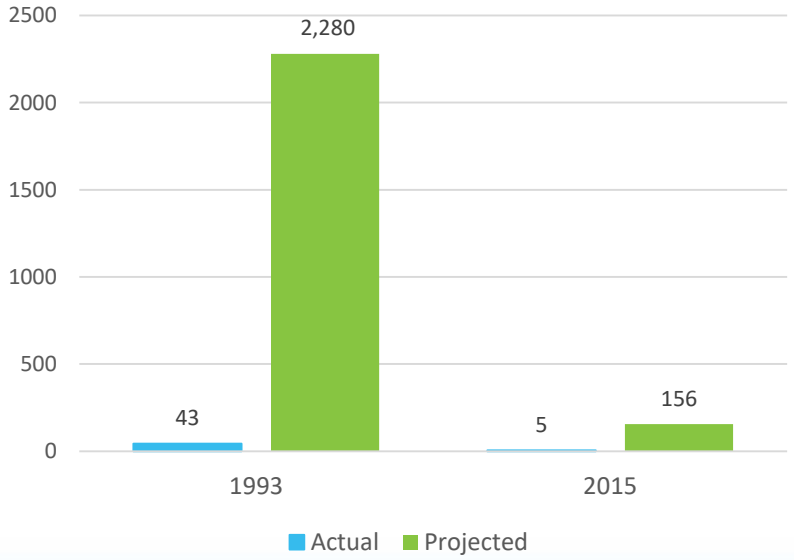
Decline in Lead Battery Incidents Over Three Decades



- NHTSA report is outdated – nearly a quarter century old
- Today's batteries are redesigned and improved
- NHTSA report and data limitations
  - Thin, unconfirmed descriptions
  - Battery reports are not categorized by chemistry

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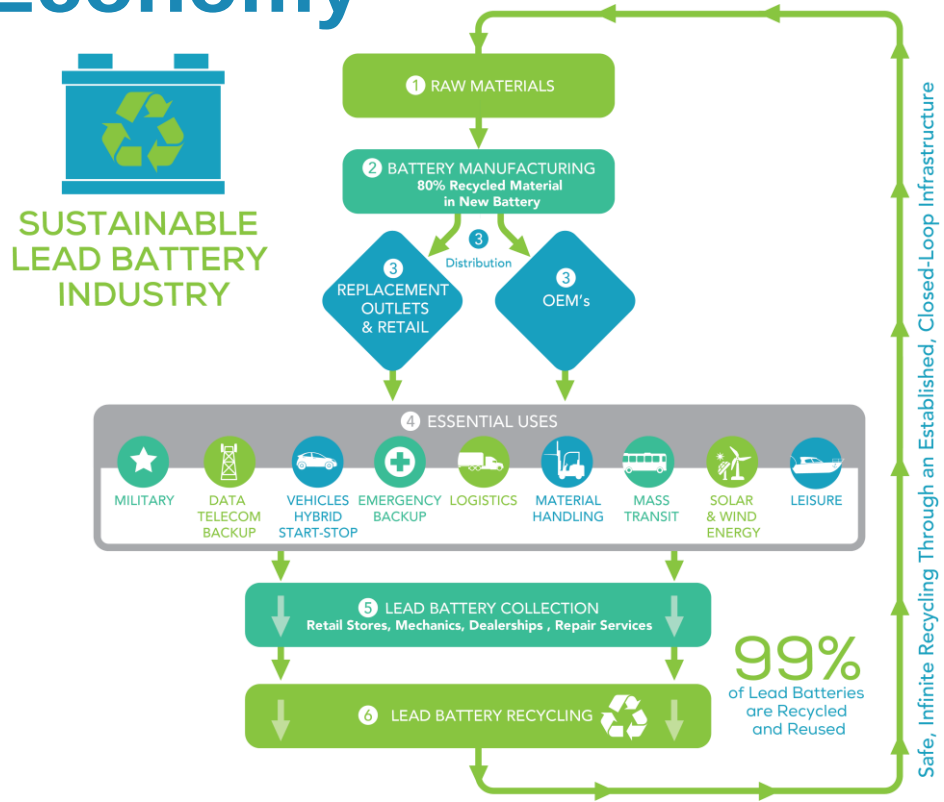
Nearly 100% Recycling: A True Circular Economy



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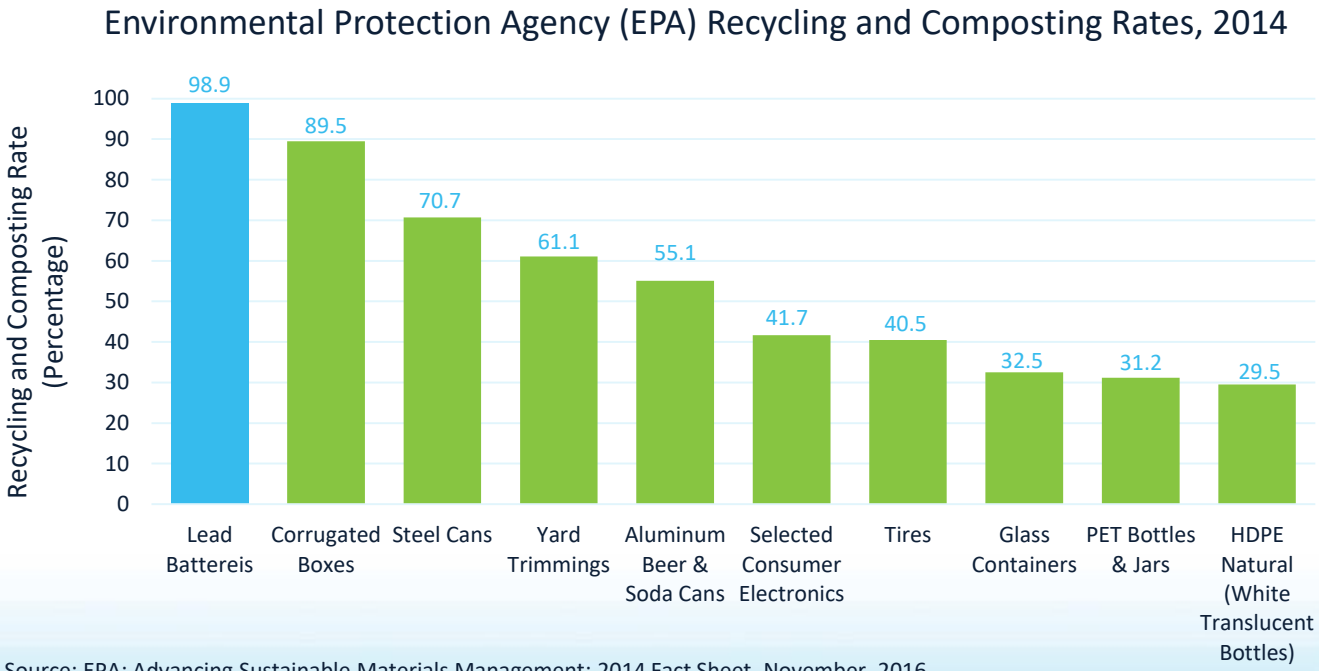
EPA Ranks Lead Batteries as the Most Recycled Consumer Product in the U.S.



Source: EPA: Advancing Sustainable Materials Management: 2014 Fact Sheet, November, 2016

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Nearly 100% Recycling: Infinite Recycling Without Loss of Performance

- DTSC misconstrues BCI's recycling rate number
  - Statistically derived using conservative life estimates; long-life batteries under-counted
  - Does not mean <1% of batteries not recycled; only a relative handful don't go directly for recycling; almost all eventually do
- No other battery chemistry can equal (closest still below 5%)
  - DTSC's focus on a mistaken "loss rate" of 1% fails to grasp that 95%+ of other battery types are going straight to landfills
- DTSC "Conceptual Exposure Model" very misleading

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Considering Alternatives

- No experience with large scale manufacture or recycling of lithium ion batteries, or how to control pollution
  - Manufacturing and mining occurs almost entirely overseas, often in “conflict mineral” areas
  - Potential health and environmental concerns for many constituents, including nickel, manganese, cobalt and solvents
  - No “drop-in” replacements and extraordinarily expensive
- A premature mandated shift from lead batteries would disproportionately burden low income residents and others who rely on used vehicles

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Lead Battery Units & Materials Are Almost 100% Recycled & Reused for New Batteries

Comparison of Recycled and Reused Materials by Battery Type

	No. of Units Recycled	% of Recycled Materials in New Batteries	% of Cell Components Recyclable by Standard Methods*
Lead batteries	> 99%	80%	100%**
Li-ion batteries	< 5%	0	35%***

Source: *Linda Gaines, Argonne National Labs
**Lead battery components: Lead, plastic, sulfuric acid
***Li-ion batteries: Cathode active material, anode active material, copper, aluminum, electrolyte solvent, plastics, steel, carbon, binder, thermal insulation, electronic parts.

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Conclusion

"Adding new responsibilities to the Department must be undertaken holistically while considering the resources and funding available. Doing anything less robs the community of a real solution and sets government up for failure."

—Governor Jerry Brown, Oct. 10, 2017

Smelting avoids some ore processing

Pyrometallurgical process commercial in Belgium

High-temperature required

Organics are burned

Valuable metals are recovered

- Co, Ni, Cu separated by leaching
- Economics depends on them
- Not available from new chemistries

Li, Al go to slag

Flexible process input

Requires high volume

Extensive and expensive gas treatment

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Courtesy of Linda Gaines, Argonne National Labs